IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claims 1-12 (cancelled)

13. (previously presented) A chemical mechanical planarization (CMP) system, comprising:

a wafer carrier configured to support a wafer during a planarization process;

an impulse heater configured to deliver a single defined heat energy pulse to a metal layer disposed on the wafer;

a sensor embedded in the wafer carrier, the sensor configured to detect heat energy emanating from a location on the metal layer due to the heat energy pulse, the sensor located to minimize reception of a reflected heat energy pulse from the defined heat energy pulse; and

a computing device in communication with the sensor, the computing device configured to calculate a thickness of the metal layer based upon the detected heat energy in relation to the defined heat energy pulse.

14. (original) The system of claim 13, wherein the sensor is an infrared sensor.

15. (original) The system of claim 13, wherein the heat energy is infrared heat energy.

16. (original) The system of claim 13, wherein the sensor is positioned to detect the heat energy in a location different from where the impulse heater delivers the defined heat energy pulse to the metal layer.

17. (original) The system of claim 13, wherein the computing device includes a storage device storing a calibration curve relating the heat energy pulse and the detected heat energy to the thickness.

18. (original) The system of claim 13, wherein the computing device is configured to calculate a heat transfer rate from values associated with the detected energy and the defined heat energy pulse.

19. (original) The system of claim 13, wherein the impulse heater is positioned on an opposing side of the substrate from the sensor.

20. (original) The system of claim 19, wherein an axis of the impulse heater is different from an axis of the sensor.

21. (original) The system of claim 19, wherein the computing device includes,

delay circuitry for delaying detection of the heat energy for a period of time after delivering the defined heat energy pulse.

22. (original) A system for detecting a thickness of a film during a chemical mechanical planarization process without contacting the film, comprising:

an infrared impulse heater configured to deliver a single defined heat energy pulse to a metal layer disposed on the wafer;

an infrared sensor configured to detect heat energy emanating from a location on the metal layer caused by the heat energy pulse, such that the sensor is positioned to substantially eliminate reception of a reflected heat energy pulse from the defined heat energy pulse; and

a computing device in communication with the sensor, the computing device configured to calculate a thickness of the metal layer based upon the detected heat energy in relation to the defined heat energy pulse.

23. (original) The system of claim 22, wherein the location the sensor detects the heat energy is different from a location where the impulse heater delivers the defined heat energy pulse to the metal layer.

24. (original) The system of claim 22, wherein an axis of the sensor and an axis of the impulse heater are substantially orthogonal to a top surface of the metal layer.

25. (original) The system of claim 22, wherein an axis of the impulse heater is substantially orthogonal to a top surface of the metal layer and an axis of the sensor is at a non-orthogonal angle relative to the top surface of the metal layer.

26. (original) The system of claim 22, wherein the computing device includes,

delay circuitry for delaying detection of the detected heat energy for a period of time after delivering the defined heat energy pulse.